

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCT/ISA/220	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/GB2004/004808	International filing date (day/month/year) 15.11.2004	Priority date (day/month/year) 14.11.2003	
International Patent Classification (IPC) or national classification and IPC B41M5/26			
Applicant THE TECHNOLOGY PARTNERSHIP PLC ET AL.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 14.09.2005		Date of completion of this report 22.02.2006	
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Bonnin, D Telephone No. +31 70 340-3004	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2004/004808

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-9 as originally filed

Claims, Numbers

1-13 filed with telefax on 09.02.2006

Drawings, Sheets

1/2, 2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2004/004808

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/GB2004/004808

- 1 The following documents are referred to in this communication:
- D1 : EP-A-0 818 308 (FUJIFILM ELECTRONIC IMAGING LIMITED) 14 January 1998 (1998-01-14)
- D2 : US-A-5 557 303 (AGANO ET AL) 17 September 1996 (1996-09-17)
- D3: US-A-5 612 198 (BRIERLEY ET AL) 18 March 1997 (1997-03-18)
- D4 : US-A-5 615 198 (KUBOKAWA) 25 March 1997 (1997-03-25)

It is noted that the publication number US-A-5 612 198 (D3) mentioned in the International Search Report should have read as US-A-5 615 198 (D4).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2 INDEPENDENT CLAIM 1

The document D2 [see column 1, lines 59-31 ; column 2, lines 19-58 ; column 3, line 55 to column 6, line 27 ; figures 1 and 2] is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document): a laser marking system (10) suitable for marking a substrate (S) in the form of paper, synthetic paper or resin film, said laser marking system (10) comprising: a laser light emitting source (12, 24); means (18, 20, 22, 28) for transmitting light from the laser light emitting source (12, 24) onto at least one point on a substrate (S); and means for displacing the substrate (S) and laser light emitting source (12, 24) relative to one another. In D2, the laser light emitting source (12, 24) comprises a semi-conductor laser (12) and a gas laser (24) which emit light in the infra red or near infra red spectrum, and the substrate (S) is sufficiently sensitive to infra red or near infra red radiation that, in use, a reaction occurs at said at least one point which marks the substrate (S).

The subject-matter of claim 1 differs from this known system in that the laser light emitting source is arranged for simultaneous multi-point marking, and in that the lasers are semi-conductor laser diodes. The subject-matter of claim 1 is therefore

new (Article 33(2) PCT).

It is noted that the subject-matter of claim 1 is also new vis-à-vis D1 and D4, due to the fact that said documents do not directly and unambiguously disclose that the laser source emit light in the infra red or near infra red spectrum.

The problem to be solved by the present invention may be regarded as the need to provide a laser marking system able to mark a substrate quickly.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: starting from D2, two steps of modification are needed to the skilled person in order to obtain a system according to claim 1; D1 and D4 relate to the marking of substrates [re D1 : printing plates, re D4 : ink films] which are different from the substrate of the present application [receipts], thus the skilled person is not prompt to combine the teaching of D2 with the teaching of either D1 or D4; even by combining D2 with D1 or D4, the skilled person has no indication that all the lasers constituting the array should be semi-conductor laser diodes.

3 DEPENDENT CLAIMS 2-13

Claims 2-13 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A laser marking system for marking a substrate in the form of paper, synthetic paper or resin film comprising:

5 a laser light emitting source;

means for transmitting light from the laser light emitting source onto at least one point on a substrate, the substrate being sufficiently sensitive to the emitted light that, in use, a reaction occurs at said at least one point which marks the substrate; and

10 means for displacing the substrate and laser light emitting source relative to one another, characterised in that

the laser light emitting source comprises an array of lasers arranged for simultaneous multi-point marking, and in that

15 the lasers are semi-conductor laser diodes which emit light in the infra red or near infra red spectrum, the substrate being sufficiently sensitive to infra red or near infra red radiation to mark the substrate.

2. A system as claimed in claim 1, further comprising a heater whose primary function is to heat the substrate prior to radiating the substrate so that the energy required to be supplied by the array of lasers for marking the substrate is minimised.

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3. A system as claimed in claim 2, wherein the heater employs a heat exchanger for transferring the heat generated by the array of lasers and/or drive electronics to the substrate.

25 4. A system as claimed in claim 2, wherein the heater is a light emitter.

5. A system as claimed in claim 1, comprising a further light emitter positioned relative to the laser array and adapted to supply sufficient light in order to bring the substrate close to the marking threshold so that as the array of lasers radiates, the marking threshold is passed due to the combined effect of the laser array and the further light emitter.

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6. A system as claimed in claim 5, wherein the light emitter radiates the substrate at a point substantially coincident with the point of laser radiation.

5 7. A system as claimed in any preceding claim, comprising means for varying the energy supplied to each point of the substrate by varying over time the pulse and/or amplitude of the transmitted light so that a scale of mark's pigmentation may be achieved.

8. A system as claimed in any preceding claim, wherein one or more optical elements are located between the said lasers and the substrate.

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9. A system as claimed in claim 8, wherein said one or more optical elements incorporate a single bulk lens and/or an array of micro lenses and/or a wave guide and/or a graded-index lens and/or a diffractive optical element and/or a reflector.

15 10. A system as claimed in any preceding claim which incorporates a plurality of radiation outputs and means for switching the path of radiation to selected outputs.

11. A system as claimed in any preceding claim, which incorporates means for directing the radiation in a plurality of directions.

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12. A system as claimed in claim 10 or 11, incorporating mechanically displaceable optical elements and/or electronically switchable diffractive elements and/or branched wave guides.

25 13. A system as claimed in any preceding claim, wherein each said laser is pulsed.